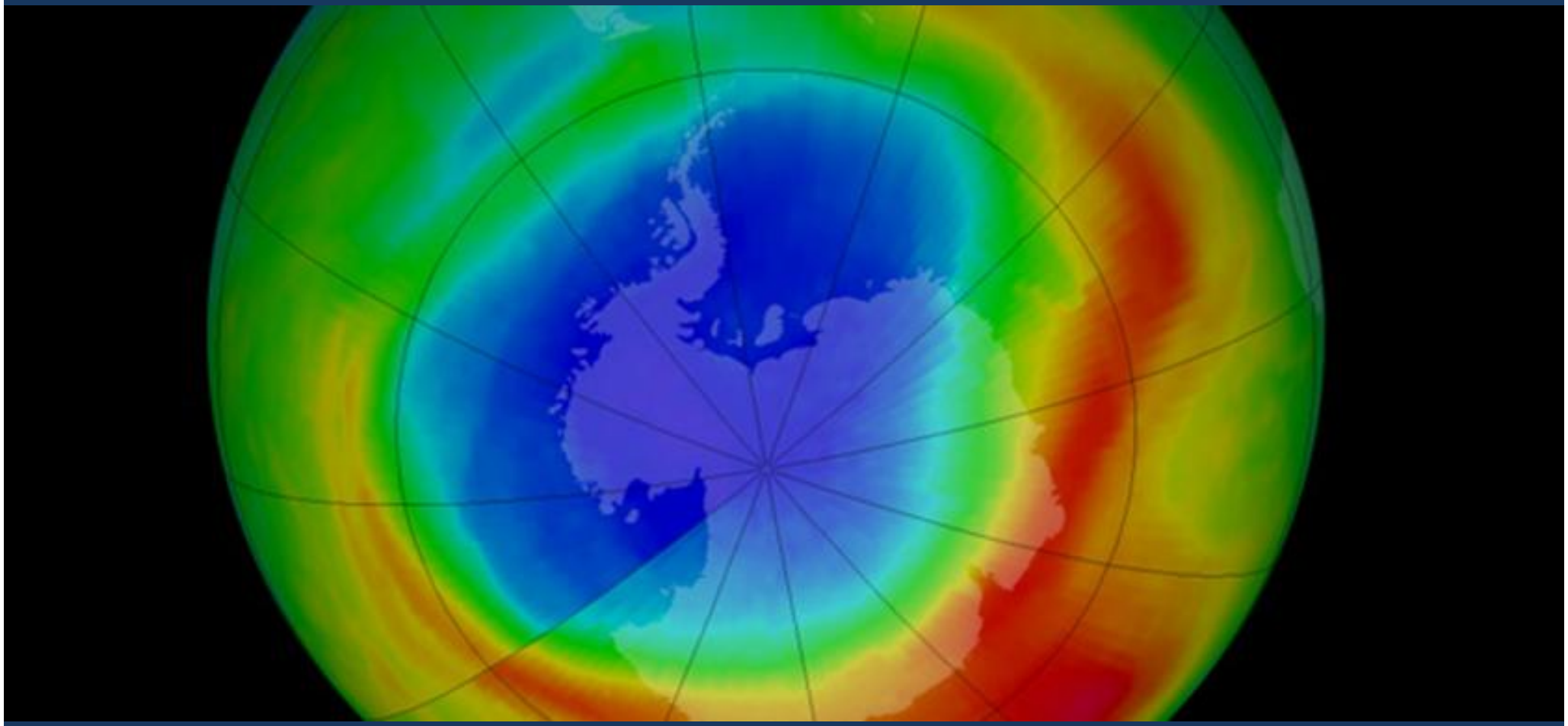
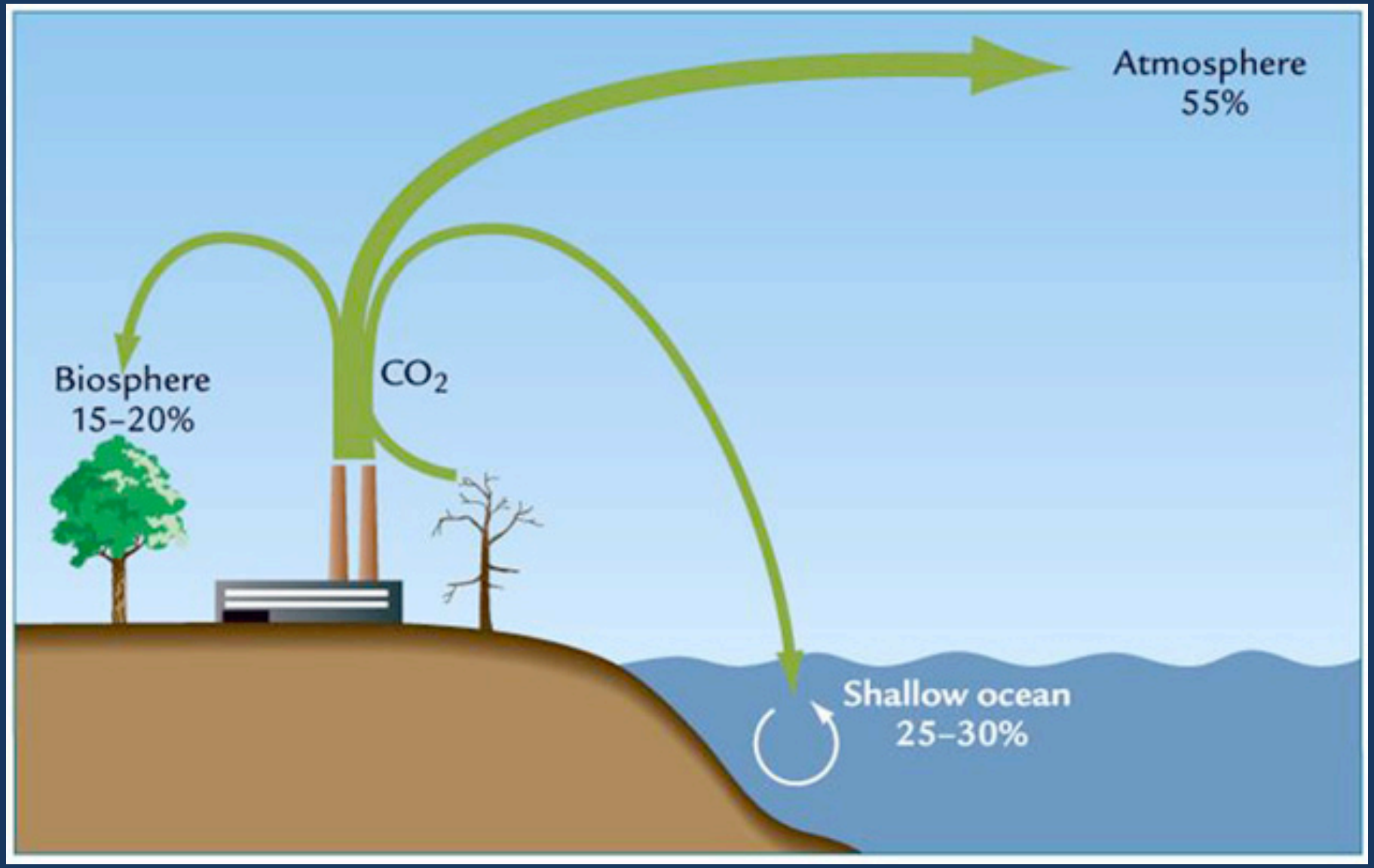


- Ozone (O3) high in the atmosphere absorbs ultraviolet radiation from the sun, thereby protecting living organisms below from this dangerous radiation. The term ‘ozone hole’ refers to recent depletion of this protective layer over Earth's polar regions. People, plants, and animals living under the ozone hole are harmed by the solar radiation now reaching the Earth's surface—where it causes health problems from eye damage to skin cancer.
- The ozone hole, however, is not the mechanism of global warming. Ultraviolet radiation represents less than one percent of the energy from the sun—not enough to be the cause of the excess heat from human activities. Global warming is caused primarily from putting too much carbon into the atmosphere when coal, gas, and oil are burned to generate electricity or to run our cars. These gases spread around the planet like a blanket, capturing the solar heat that would otherwise be radiated out into space. (For more detail on the basic mechanism of global warming, see carbon dioxide FAQ.)


Atmosphere
55%
Biosphere
15–20%
CO_2
Shallow ocean
25–30%

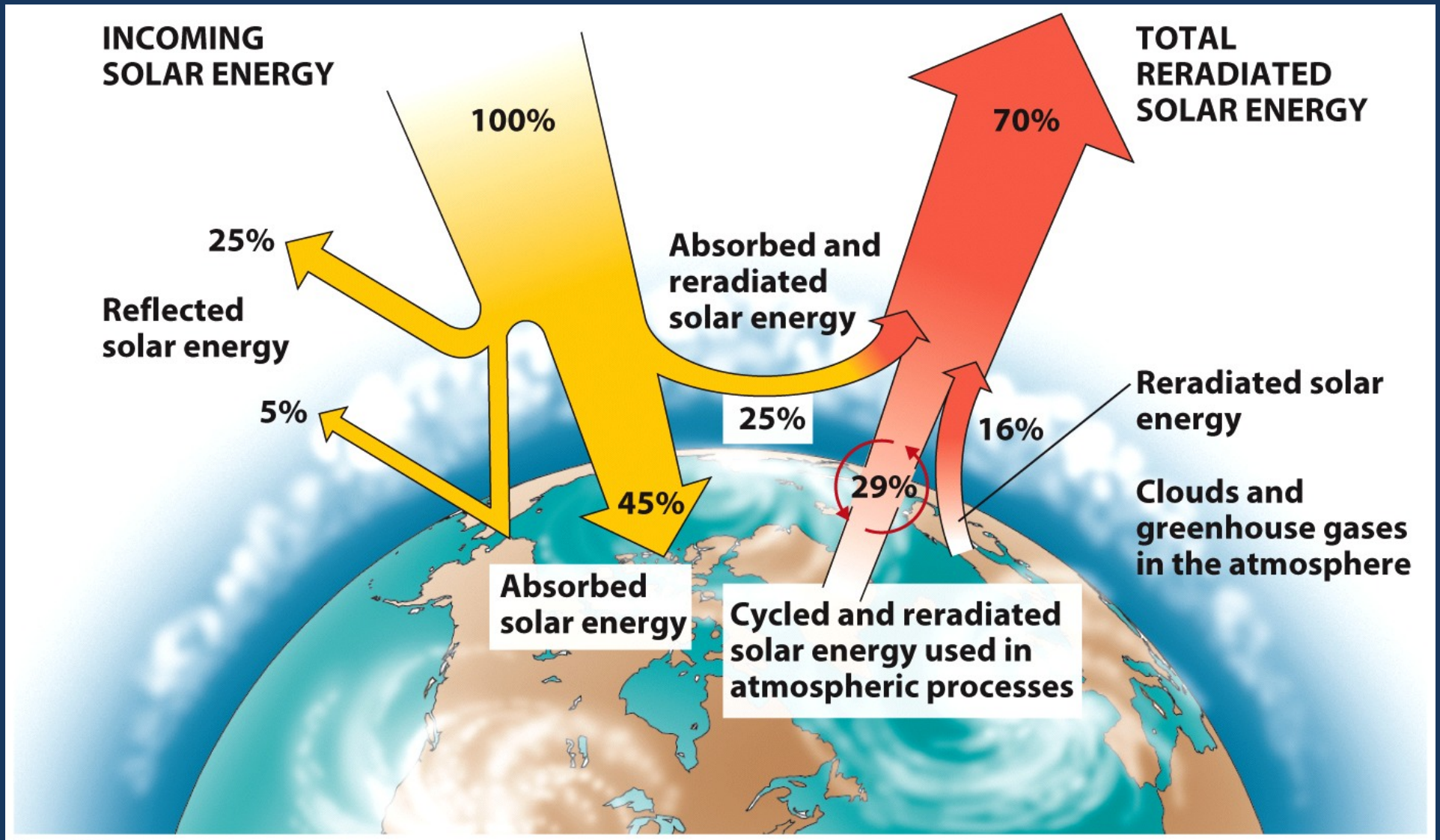


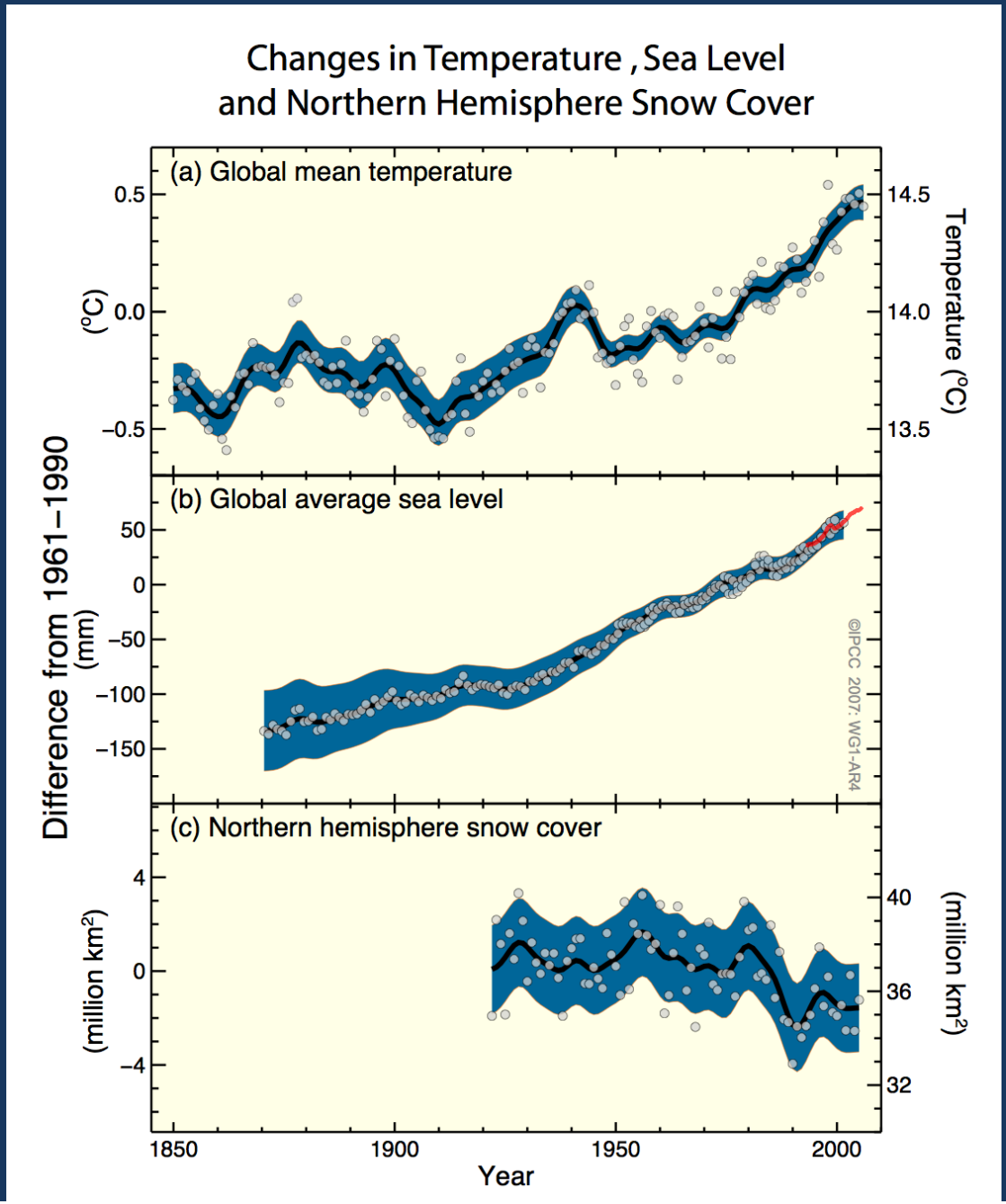
Figure 13-5
Environmental Geology, Second Edition

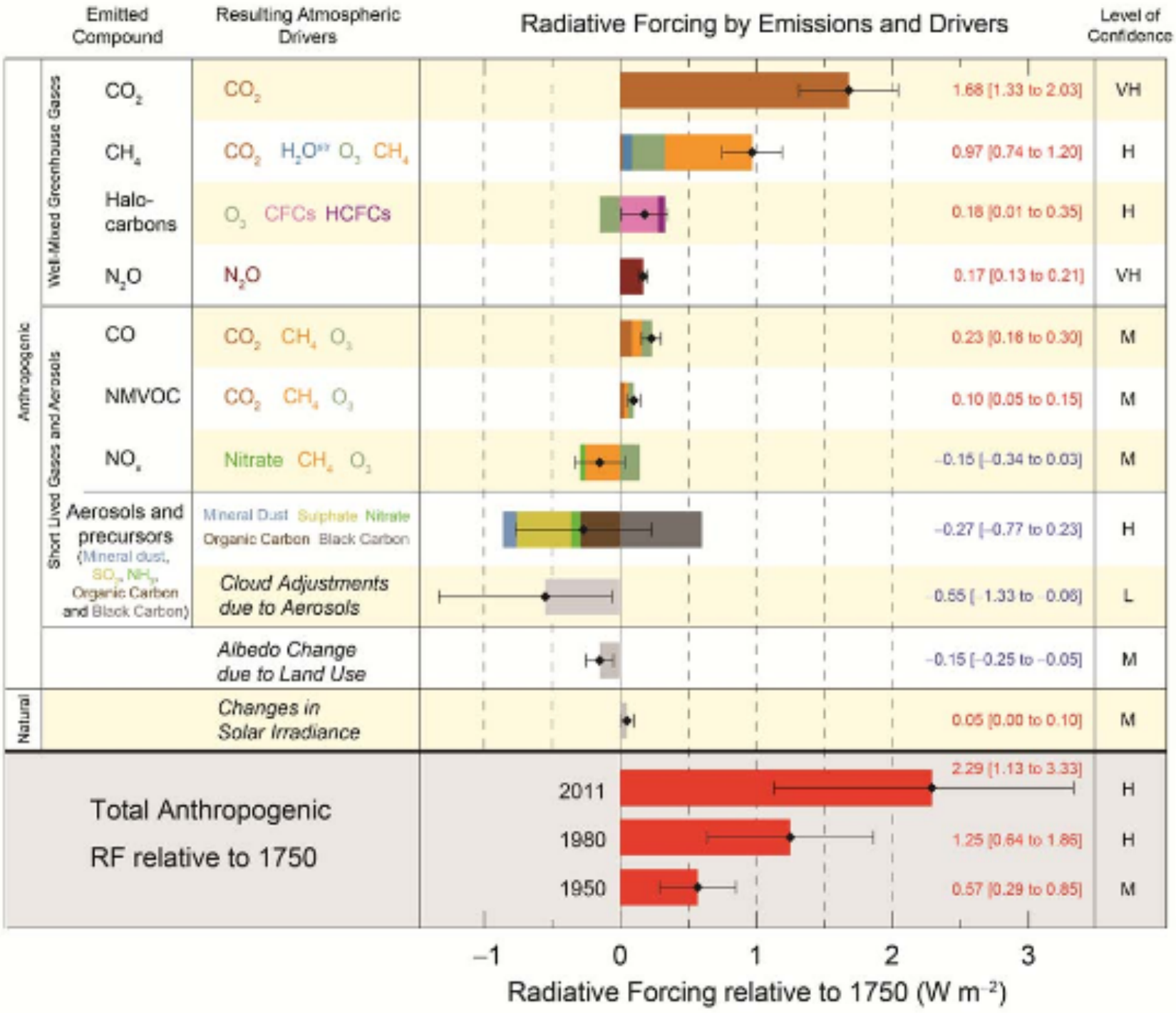
Direct Observations of Recent Climate Change

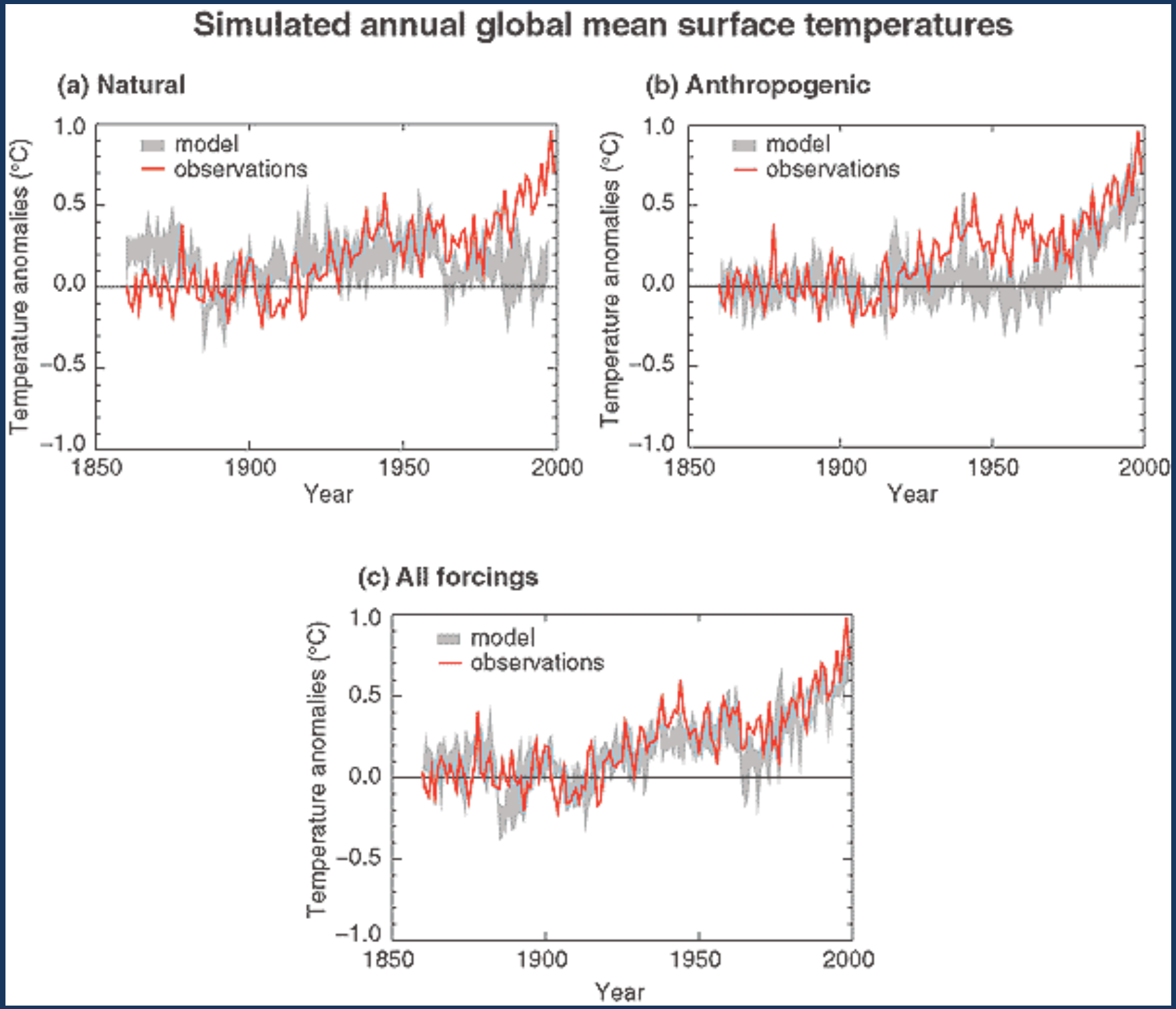
Gobal mean temperature

Global average sea level

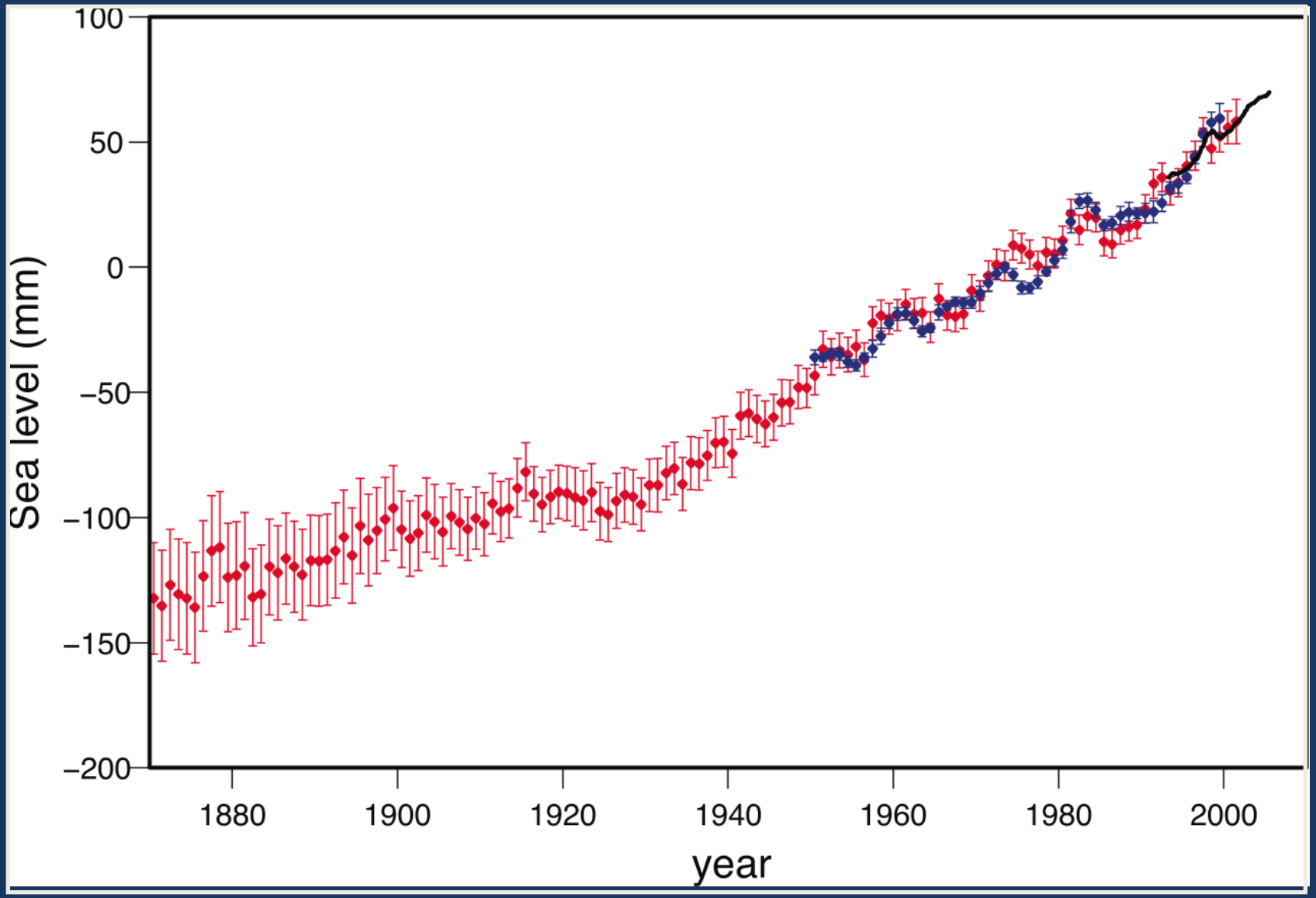
Northern hemisphere Snow cover




Emitted Compound
Resulting Atmospheric Drivers
Radiative Forcing by Emissions and Drivers
Level of Confidence
Anthropogenic
Well-Mixed Greenhouse Gases
Short Lived Gases and Aerosols
Natural
CO2
CH4
Halo-carbons
N2O
CO
NMVOC
NOx
Aerosols and precursors (Mineral dust, SO2, NH3, Organic Carbon and Black Carbon)
CO2
CO2 H2O(s) O3 CH4
O3 CFCs HCFCs
N2O
CO2 CH4 O3
CO2 CH4 O3
Nitrate CH4 O3
Mineral Dust Sulphate Nitrate Organic Carbon Black Carbon
Cloud Adjustments due to Aerosols
Albedo Change due to Land Use
Changes in Solar Irradiance
1.68 [1.33 to 2.03]
0.97 [0.74 to 1.20]
0.16 [0.01 to 0.35]
0.17 [0.13 to 0.21]
0.23 [0.16 to 0.30]
0.10 [0.05 to 0.15]
-0.15 [-0.34 to 0.03]
-0.27 [-0.77 to 0.23]
-0.55 [-1.33 to -0.06]
-0.15 [-0.25 to -0.05]
0.05 [0.00 to 0.10]
VH
H
H
VH
M
M
M
H
L
M
M
Total Anthropogenic RF relative to 1750
2011
1980
1950
2.29 [1.13 to 3.33]
1.25 [0.64 to 1.86]
0.57 [0.29 to 0.85]
H
H
M
-1
0
1
2
3
Radiative Forcing relative to 1750 (W m-2)


Simulated annual global mean surface temperatures
(a) Natural
(b) Anthropogenic
(c) All forcings
model
observations
Temperature anomalies (°C)
1.0
0.5
0.0
−0.5
−1.0
1850
1900
1950
2000
Year

20 cm rise
in 120 years



Contemporary
Sea Level Rise

IPCC - AR4

Table 13.1 | Global mean sea level budget (mm yr^{-1}) over different time intervals from observations and from model-based contributions. Uncertainties are 5 to 95%. The Atmosphere–Ocean General Circulation Model (AOGCM) historical integrations end in 2005; projections for RCP4.5 are used for 2006–2010. The modelled thermal expansion and glacier contributions are computed from the CMIP5 results, using the model of Marzeion et al. (2012a) for glaciers. The land water contribution is due to anthropogenic intervention only, not including climate-related fluctuations.

Source	1901–1990	1971–2010	1993–2010
Observed contributions to global mean sea level (GMSL) rise			
Thermal expansion	–	0.8 [0.5 to 1.1]	1.1 [0.8 to 1.4]
Glaciers except in Greenland and Antarctica[a]	0.54 [0.47 to 0.61]	0.62 [0.25 to 0.99]	0.76 [0.39 to 1.13]
Glaciers in Greenland[a]	0.15 [0.10 to 0.19]	0.06 [0.03 to 0.09]	0.10 [0.07 to 0.13][b]
Greenland ice sheet	–	–	0.33 [0.25 to 0.41]
Antarctic ice sheet	–	–	0.27 [0.16 to 0.38]
Land water storage	–0.11 [–0.16 to –0.06]	0.12 [0.03 to 0.22]	0.38 [0.26 to 0.49]
Total of contributions	–	–	**2.8 [2.3 to 3.4]**
Observed GMSL rise	**1.5 [1.3 to 1.7]**	**2.0 [1.7 to 2.3]**	**3.2 [2.8 to 3.6]**